EVOLUTION
and the
Blood-Precipitation Test

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Affectionately Dedicated to my
very dear friend,

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For whose sound advice, unfailing sympathy, and generous appreciation, the author desires to express his thanks.

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by

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"Evolution—The Acid Test"
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FOREWORD

This essay, the author believes, is a conclusive answer to those who submit the results of the "Blood-Precipitation Test" as evidence for evolution.

That the argument presented herein in regard to the obvious fallacies of this blood evidence, is correct and unanswerable, is shown by the endorsations of Professor George McCready Price and Louis Trenchard More, whose opinions are submitted.

The writer has attempted to put this somewhat technical subject into language which can be understood, after careful reading, by anyone of average intelligence and education. The argument will repay close examination and study.

Prof. L. T. More is Dean of the University of Cincinnati, and Professor of Physics. He is acknowledged to be one of the world's leading physicists. His book, "The Dogma of Evolution," is one of the most powerful ever written on this subject. This book has given the Creationists some of the most effective ammunition they have yet secured

Prof. George McCready Price is one of the world's leading Geologists. He has written a number of books, including "Fundamentals of Geology," "Q. E. D.," "Back to the Bible," "The Phantom of Organic Evolution," and "The New Geology."

His name will go back down in history because of the last-named book, which is undoubtedly, the sanest, clearest and most irrefutable presentation of the Science of Geology from the standpoint of Creation and the Deluge, ever to see the light of day.

Because of his anti-evolution views and the unanswerable character of his interpretations of the mass of scientific data he has uncovered from the rocks, he has called down on his head the wrath and scorn of modern leaders of evolutionary geology, who refuse to recognize his right to pre-eminence as a scientist, even if they are unable to discover any flaws in his logic.

It is a pleasure and a privilege to present the endorsations of these two acknowledged scientists, and also the opinion of an eminent religious leader of international reputation, and great scholarship,—Dr. John L. Campbell, Dean of the Bible Department of Carson-Newman College, Jefferson City, Tennessee.

Professor Louis Trenchard More, Dean of the University of Cincinnati, and Professor of Physics, author of "The Dogma of Evolution," and one of the most eminent modern scientists.

> "I thank you very much for the opportunity of reading your paper on "Blood and Evolution." I certainly do agree with your main idea that to test the serum prepared from the living animal is not in any way a study of blood as it exists in a living organism. I also agree with you in your final conclusion, that unless we are absolutely certain (and we are not certain) that blood from two animals can be chemically similar without having a common ancestor, we have no right to draw inferences which have been drawn. And I feel as you do that it is an unwarranted assumption to suppose that inheritance alone can account for structural resemblances."

Professor George McCready Price, one of the most eminent living Geologists, author of many scientific books, especially his latest one "The New Geology," an unanswerable presentation of the Creational view of

Geology, and a complete refutation of the current geological teachings.

> "Your article on "Blood" is absolutely splendid. It is away out of sight of any competitors on this particular subject. It ought to be circulated everywhere, and I hope you will have it printed at once in pamphlet form. It is much needed, and you have done the job so handsomely that no one of the rest of us need tackle this subject, in the way of writing, if you will put this in permanent form."

Dr. J. L. Campbell, Dean of the Bible Department of Carson-Newman College, Jefferson City, Tenn. Dr. Campbell is one of the strongest preachers, writers and best qualified scholars on the continent.

> "Your article on the Blood (I am weighing my word) is the ablest thing I have ever read on the whole subject of evolution. I have read and reread it. Your mastery is complete and your refutation more than its weight in gold, and further, I do not know anyone else who could write it."

Evolution And
The Blood-Precipitation Test

During the past year or two, and particularly during the past few months, the evidence derived from thousands of highly technical experiments with the blood serum of man and different animals—most of these tests conducted several years ago—(in 1904 to be exact)—has been repeatedly proclaimed as the strongest proof yet discovered in support of the evolution theory,

One reason for this sudden access of enthusiasm for this line of argument may be found in the confusion and doubt among evolutionists because of the decline in value of other alleged "proofs."

Viewed superficially, or by those who do not possess a fair working knowledge of physiology, it seems to offer a rather strong corroboration of transformist claims. On account of its inherent complexity and difficulty it has been somewhat neglected by those who repudiate the idea of a bestial origin for mankind.

Upon a close scientific investigation of the question, with the latest findings of physiology at our disposal, the case for the evolutionist proves to be very weak and his "strong evidence" vanishes before the logic of facts.

As everyone knows, blood is that life-fluid flowing swiftly and ceaselessly through the marvelous system of tiny tubes in our bodies made up of arteries, veins and capillaries. The arteries are the vessels which carry the red oxygenated blood from the heart to all parts of the body. They gradually diminish in size as they branch in a wide network, at last becoming so small that they accommodate but one microscopic cell, in the minute channels known as capillaries which connect the arteries with the veins. The capillaries are spread out all through the tissues and organs and gather up the flow to discharge into the veins, whose function is to carry the blue blood (blue because loaded with carbon dioxide gas instead of Oxygen which has been burnt up in the body) back to the lungs in which it discharges the Carbon Dioxide gas and other impurities to be expelled in breathing. In the lungs it loads up with a fresh supply of Oxygen, again enters the left chambers of the heart and resumes its journey. Back and forth it travels on its round trip constantly varying in its composition as the amount of Oxygen and Carbon Dioxide changes and its food content alters with the continual addition of nourishment and discharge of waste matter.

The food taken into the stomach undergoes the process of digestion by which it is changed into a milky fluid, which is extracted from the intestine by little wide open mouths leading to another series of tubes called lymph channels. These gradually unite into one duct through which the fully digested food, prepared for assimilation and now ready to be absorbed into the system, is emptied into a large vein at the root of the neck, close to the heart.

Blood contains two definite and distinct parts, one solid, the other liquid. The solid portion is composed of small, round, protoplasmic masses called cells, red and white. The red cells derive their color from their contained Haemoglobin, a chemical having a remarkable affinity for Oxygen which it snatches at every oporunity from the oxygen-filled lungs, the air-station through which all the dark carbonated venous blood must pass.

Besides Haemoglobin, the red cells have, like the white, much protoplasm, with its variety of chemicals, to be noticed presently.

The white cells are less numerous than the red,—

one to seven or eight hundred — but are larger, can change their shape and move independently. They have a different and distinct function in devouring invading germs, and perhaps assisting in the manufacture of substances to antagonize the poisons of disease-producing bacteria.

In common with red cells they are composed largely of protoplasm and a group of chemicals.

Protoplasm is the material basis of all living organisms. It is derived, naturally, from the medium which surrounds it, and the elements which compose the body framework must therefore be identical with those found in the earth's crust. The Biblical statement, then, that man was formed from the dust of the earth is verified by physiological investigations.

Every living organism, without exception, contains the following elements which are found also in the ground beneath our feet,—Carbon, Hydrogen, Oxygen, Nitrogen, Sulphur, Phosphorous, Chlorine, Potassium, Sodium, Calcium, Magnesium and Iron.

Some others contain, in addition, silicon, iodine, fluorine, bromine, aluminium, manganese and copper.

We see then, that the principal constituents of the blood cells are a large number of chemicals in complex combinations with one another, floating in a fluid medium.

Human blood is made up of rather more than one-third to one-half its weight of corpuscles or cells. It contains from 20 per cent to 25 per cent solids. The liquid part of the blood is named plasma, and this, by clotting, is broken up into serum and a substance called "fibrin;" the latter formed from a normal constituent of the plasma "fibrinogen," which is acted upon by the lime salts of the blood, in the presence of small cells, known as "platelets," thought to be a product of the clotting change. The platelets break up and release "thrombokinase" which combines with another chemical "thrombogen" to form "thrombin." Thrombin unites with fibrinogen, and fibrin — the end result of clotting,—occurs as a fine network of threads which enmesh the cells into a jelly-like mass. This mass falls to the bottom, leaving the serum in the upper portion of the vessel.

Thus, we understand that blood consists of cells and plasma, the plasma made up of serum and fibrinogen. It is necessary constantly to remember that what the scientists are using in their so-called blood tests, is nothing but serum—a small part of blood.

Fibrin forms only one five-hundredth to one two-hundred and fiftieth of the total weight of blood.

The serum contains in 100 parts, 8 to 9 parts of solids, of which seven to eight parts consist of nitrogenous compounds called proteins, while the salts make up about one part.

The chief salt present in the serum is sodium chloride-table salt,—about sixty per cent. Next in order comes sodium carbonate, about 30 per cent, and besides these two we find traces of potassium, sodium, and calcium chlorides, and phosphates. Traces of fats, cholesterin, locithin, dextrose, urea, and other nitrogenous extractives, are constantly found in the serum.

The red corpuscles contain from 30 to 40 per cent total solids, and of the solid constitutents, haemoglobin forms nine-tenths. The other tenth corresponds to the framework of protein (Nucleo-protein), lecithin, and cholesterimand salts.

There is a striking contrast between the salts of the corpuscles (cells) and those of the serum, the former consisting chiefly of potassium phosphate, while in the latter sodium chloride (common salt) predominates. In some animals there is no sodium chloride in the cells.

This somewhat detailed account of the general chemical composition of blood, which is correct according to the most modern findings,—proves that if the blood cells are taken out of the blood, we have withdrawn a most important group of chemicals, in the absence of which we are not testing **blood** at all.

It is possible, moreover, that the cellular protoplasm —the most complex, baffling, and mysterious substance in the world,—contains many other things about which we know nothing. These, of course, are necessarily absent from the test fluid.

We are sure, however, that there is in the protoplasm of our bodies something of which we are in total ignorance, namely, the life-principle. Of the nature of life, its origin, its powers, its reproductive faculty, its ability to feed and sustain itself and the reason and manner of its departure from the cell at the moment of death, we are in profound ignorance. An impenetrable wall meets our attempt to inquire into these abstruse problems.

Let us recall a few important facts. Blood is an ever-changing mixture of solids and liquids, cells and plasma, holding within it from 12 to 20 different chemical substances identical with those found in the dust of the field. These are combined in a most intricate fashion and are controlled by the most elusive and wonderful force known to mankind,—life. Remember that when "blood" tests are made, all the cells with their protoplasm and chemicals, are removed; also, the plasma is changed by the formation of fibrin, the extraction of which leaves us only a liquid known as serum—a remarkable fluid, but vastly different from original blood, or even plasma.

The serum contains complex proteins (combinations with nitrogen) in two forms,—serum albumen and serum globulins—which probably do not exist side by side in the serum, but are combined to form serum-protein,—a very complicated unit.

Professor Ernest R. Starling, M. D., Hon. Sc. D. (Cambridge and Dublin), F. R. C. P., Jodrell, Professor of Physiology, University College, London, in his recent book, "Principals of Human Physiology," writes:

> "The question naturally suggests itself whether in plasma we have not a combination of all its varied colloidal constituents to form one labile mass of fluid protoplasm."

The shattering of this combination changes the whole nature of the fluid and invalidates the test. And, as we shall see, before we can make any tests the combination **must** be broken up by the process of clotting.

The clotting or coagulaion of blood is a well-known but complex and little-understood process. As stated in the earlier part of this discussion, it involves the formation of fibrin which enmeshes the blood cells. Clotting ensues whenever blood escapes from its natural habitat—the blood vessels, and undergoes any slight change in the plasma leading to cooling or contact with air or a foreign body. Blood platelets form and then occurs the succession of changes already enumerated.

Starling says:

> "In every case the initiation of the act of clotting would seem to depend on the setting free of thrombokinase in the plasma."

The sole source of thrombokinase is the very perishable formed elements, the platelets, which are probably not found normally in blood. Other substances called antithrombins—which are anti-bodies or antagonizers of fibrin ferment, preventing clotting in circulating blood,—are mentioned by some authorities as constitutents of blood.

This brief account of the complex chemistry of the blood demonstrates the highly intricate composition of this life-fluid. We can easily understand how false interpretations can be made from experiments which must be of the greatest delicacy, accuracy and uniformity, and in the performance of which, the slightest alteration or mistake in technique would bring different and conflicting results. It will be proved that the confident and definite conclusions of the evolutionists are logically unjustifiable and in the nature of things impossible.

Before dealing with the actual tests themselves there are a few related phases of this morphological argument which may be briefly mentioned because they have a distant bearing on the whole question.

It is not generally realized how inconstant is the composition of human blood and how great are the differences between the blood from different human beings.

Following the work of De Castallo and Sturli, Landstemer and Leimer, Moss and Jansky have shown that all human beings can be divided into four groups, as told by the ability of their red blood cells to be dissolved or clumped together (agglutinated) by other human sera, and the ability of their serum to agglutinate other human red cells.

These four groups are characterized as Types 1, 2, 3 and 4. Groups 3 and 4 are about equally common and comprise about eighty-five per cent of all individuals. Group 2 forms about ten per cent and group 1 about five per cent. This "typing" is of immense importance in the operation of transfusing, a valuable treatment for certain diseases, whereby the blood of one individual is introduced into the veins of another. The person who gives the blood is known as the "donor" and the recipient, of course, is the patient.

Group 4 constitutes a universal donor because these cells cannot be agglutinated or damaged by any plasma.

The red cells of Group 1 will agglutinate the serum of groups 2, 3 and 4, the cells of group 2 will act on groups 3 and 4, while group 3 is incompatible with groups 2 and 4.

In transfusion, if the wrong types are mixed, very serious and even fatal, reactions may follow. These reactions, obviously, do not prove that either the donor or the patient is not a member of the Genus Homo, as should be the case if we interpret the result according to the principles adopted by the evolutionist.

The serum of the horse can be used with perfact safety on a human. This does not prove genetic relationship for the horse, nor on the other hand would incompatibility disprove it.

Professor Brumpt found that animals inoculated with the blood of men suffering from sleeping sickness, contracted the disease. The only exceptions were a few apes and pigs. Does this prove a close relationship between these two classes of animals and a separation from other animals and men? No such conclusions can be drawn.

Metchnikoff and other experimenters have tried to develop syphilis in chimpanzees, apes, and monkeys, by inoculating them with a virulent form of the disease, but obtained only very feeble reactions. Does this prove the opposite to the preceding experiment?

All such inferences are absurd and Professor Rossle one of the foremost investigators along this line claims that the blood reaction does not indicate, **nor does it correspond to** the relation existing between any two animals. The facts of comparative anatomy are often in opposition to the findings from the blood.

Between animals and men there are many resemblances but more striking contrasts. As similarity in bodily structure does not prove blood relationship, neither can dissimilarity necessarily be used as proof against such relationship. The mental and spiritual qualties of man separate him by an impassable gulf from all lower animals. This is the real test of heredity and if two individuals have nothing in common in these realms, we can reasonably affirm that they have no "common ancestor."

Again, compare asses' milk and human milk. By adopting the evolutionary logic we could come to some ridiculous conclusions. The qualitative chemical analysis reveals the fact that of all mammals, the ass is closer to man in this respect. We would not dare to insinuate, however, that the latter must class himself with this long-eared fraternity, nor, that because horses' milk is nearest in composition to that of the ass, that we should arrange them in this genetic order from above downwards—viz., man, ass, horse, cow.

We come now to the blood tests from which so much is claimed for evolution. Professor Horatio Hackett Newman, Zoologist, University of Chicago, is one of the leading scientists who gave the most extended testimony for evolution at the Scopes trial. His views may be taken to represent the most modern evolutionary view. In the course of his lengthy statement, which covers all the arguments for the theory, he gives considerable prominence to the evidence from blood. In his statement reproduced below, the bold type is inserted to emphasize certain points. Prof. Newman states:—

> "The methods of classifying animals just outlined depend upon relatively gross criteria (homologies), as compared with the refinements characteristic of the serological technique used in blood testing. The latter method of classifying animals depends upon chemical similarities and differences in the blood of various animals, and the basic assumption is, once more, that degrees of resemblance parallel degrees of blood relationship. Recent investigation has shown that certain materials in an animal's blood are even more sharply specific than are its visible structural characteristics. Chemical tests of extreme delicacy are used to reveal resemblances in blood. Thus, if we wish to find out what animals are most like man in blood composition, we can find it out in the following manner: **Human blood is drawn and allowed to clot, a process that separates the solid materials in the blood from the liquid serum. The latter watery fluid contains the specific human blood ingredients.** Small doses of it are injected at two-day intervals into the blood vessels of a rabbit. At first the rabbit is sickened by the injection, thus showing a marked reaction to the foreign material. In the course of a short time, however, there is no further reaction, and we may conclude that the rabbit is immune. What has happened is that some substance has been developed in the rabbit's blood which neutralizes the toxic

effects of human blood. It is a sort of antitoxin and may be spoken of as anti-human serum, a material that may now be used as a delicate indicator of blood kinship. When this anti-human serum is mixed with serum taken from the blood of any human being an immediate and definite white precipitate is formed; when mixed with that of any of the anthropoid apes the precipitate is similar to that formed with human serum, but less abundant reaction and somewhat slower in appearing. The tests showed a less prompt and less abundant reaction with the blood of old world monkeys, a slight but definite reaction with that of new world monkeys, and no noticeable reaction with that of lemurs.

"The tests further indicate that, if strong enough solutions are used and time enough allowed for the 'Precipate' to settle, there is an unmistakable blood relationship among all mammals, and that degrees of relationship run closely parallel with those based upon homologies. Not only this but not a few affinities, the existence of which had been only vaguely suggested by comparative anatomy, are strongly emphasized by blood tests. One most remarkable revelation is that whales, the most specialized among mammals, are more closely related to the ungulates (hoofed animals), and especially the swine family, than to any of the other groups of the class mammalia,—a diagnosis that had previously been made by several anatomists on what appeared to be slender morphological grounds.

"At the present time the technique of blood-testing for animal affinities is rather difficult, and very few workers have attempted to make use of it. The results so far attained, however, are so definite and clean-cut that there is every reason to expect a great future for this type of evolutionary evidence. Many groups of animals have already been tested and, in general, the affinities indicated closely parallel those based upon homologies. There is, however, no exactness about this parallel; nor could we expect such to be the case; there is no exact parallelism between the teeth and the feet, between the head and the tail. No two systems of an organism exactly keep pace in their evolution; one may remain relatively conservative while the other may become greatly specialized. Of all systems the blood seems to have been the most conservative and to have retained most fully its ancestral characters. It is on this account that blood tests are so valuable in revealing relationships that can scarcely be determined in any other way.

"Far more important than any information as to animal affinities revealed by blood tests is that the classification of animals based on blood tests is essentially the same as that based on morphology

> . . . . . the two systems of classification point to the same lines of descent!"

In the first place, we notice the manner of conducting the tests, the technique of which he admits is "rather difficult;" rather!, so much so, in fact, that very few workers have attempted it.

It may be that the scarcity of workers in this field is due not only to the inherent difficulties of the tests, but also to the fact that most scientists perceive the obvious impossibility of proving anything from blood-serum. And yet, many who do not place much reliance in it themselves, remain silent when their evolutionist confreres assert themselves so positively. Occasionally, evolutionary ethics are responsible for some strange inconsistencies. Nuttall's experiments are the basis of practically all of the comments by evolutionists. They were performed 21 years ago and not repeated since, either by him or anyone else. The reason is shown in his own summary of the work, mentioned later in this article.

Notice, then, that "human blood is drawn" into a vessel, "and allowed to clot." This operation, as we have learned, extracts all the solid materials and leaves behind only the fluid portion. But the learned professor goes on to say,—and for all we can tell he is quite serious—"The latter watery fluid contains the specific human blood ingredients."

He must know that this is far from the truth. Think what has been done. The blood cells have all been killed and removed, carrying with them the all-important life principle, and most of all the chemical constituents of blood.

Also, the process of clotting has caused the appearance of "platelets" and new chemicals in different combinations. Yet, notwithstanding this, we are asked to believe that the experimenters are dealing with human "blood." The truth, which cannot be questioned, is that this watery, altered, fluid residue—"serum"—has really very little in common with the original blood. Certainly no individual could live for five minutes if it replaced the normal liquid in the vessels of the body.

When this "serum" is injected into rabbits, horses, apes, monkeys, man, etc., the operation is nothing more than the transference of a solution of certain salts, chiefly table salt, in water. It has a faint resemblance to blood, but is now a poison, or toxin, or "antigen," of which there are many, all having the power of developing in the blood into which they are introduced, a group of substances called "antibodies." In this case the particular "antibody" formed is "preciptin." It causes the throwing-down of a deposit or "precipitate" in the blood of the receptor. Hence this test is known as the "Precipitation" test.

Antibodies are of the nature of antitoxins or antogonizers of toxins or poisons, and in their formation, we are witnessing one of many mysterious phenomena in the functioning of the marvelous defensive mechanism of the body when it is called upon to repeal and nullify attacks on it from without.

The Professor writes that "degrees of relationship run closely parallel with those based upon homologies," —Comparative Anatomy and the like. This too, is not correct, as many authorities acknowledge a number of conflicting results from the different methods of comparison. Newman himself modifies his assertion when he admits, "there is no exactness about this parallel." Then, why mention it at all?

A friend of the writer, Professor Charles Hill-Tout, the well-known anthropologist of Vancouver, B. C., has just issued a book, "Man and His Ancestors." It is an attractive and forcible presentation of the subject from the transformist view-point. He devotes one entire chapter to this blood-argument, which he considers one of the strongest and most convincing for his theory.

In addition to many unwarranted interpretations of the facts, there are some inaccuracies. He would lead us to infer that the blood cells of all mammals, subjected to "ordinary chemical analysis" reveal practically no differences, a statement which is frequently copied from book to book, and is usually allowed to pass unquestioned by the uninformed reader.

The fact is that most modern text-books on Physiology, give tables showing marked contrasts between the blood of all mammals and man.

In the 1925 edition of "The Blood," a book written by Professors Gulland and Goodall of the Department of Medicine, University of Edinburgh, chapter eleven is devoted to "The Blood in certain Animals."

In this chapter, a table is given which compares the blood of fifteen mammals, and great dissimilarities are shown in the number and proportions of the various cellular elements, both when compared with one another and with man.

Another table reveals great differences in the size of the cells, and in their staining qualities, explained by the variation in chemical composition of their protoplasm.

In their discussion of "Haemophilia," a disease of the blood marked by diminished clotting power, and in which there is danger of serious and even fatal hemorrhage from a slight cut, they mention a well-known fact under "Treatment." It is this,—the blood serum of rabbits may be injected, with very favorable and curative results, into the human patient, but ox-serum causes severe and dangerous symptoms. What is the significance, if any, of this peculiar fact?

The rabbit belongs to the family of Rodents, which, according to evolutionary Zoology, is just above the Insectivora, and below the Ungulata or Hoofed-Mammals. The Rodents include rats, mice, squirrels, porcupines, rabbits, etc. Four groups are recognized, of which the squirrels, porcupines, rats and rabbits, serve as types. The rabbit group includes hares, rabbits, and picas.

The next group above rabbits are the Ungulata, of which there are two sub-divisions, Perissodactyls or Odd-Toed, and Artiodactyls or Even-Toed Hoofed Mammals. Of course, different "common ancestors" are assumed because of the wide gaps, between animals like the horse and rhinoceros, or pig and hippopotamus.

The order Artiodactyls is made up of non-ruminants (pigs, peccaries and hippopotami), and the much larger group of ruminants (cud-chewers), giraffes, deer, antelopes, sheep and cattle. The last two are considered the "highest and most progressive."

And yet, strange to say, the blood serum of the ox, which according to the theory, is much nearer to man than the rabbit, is poison to man, while the serum of the rabbit, a million or more years removed from man, —again according to the theory,—is entirely compatible with human serum and shows a much more marked resemblance in chemical composition.

What conclusions are we to draw as to the value of the elaborate and exact (?) classification of animals, constantly presented by the evolutionist and based on the serum test? The multitude of inexplicable contradictions render this classification absolutely without meaning to the critical and intelligent student.

Most writers on blood confess to an immense ignorance concerning this baffling, complex solution of living cells and chemicals, and readily admit that all opinions on its chemistry, comparing man with man, and especially man with other mammalians, are certain to be erroneous because of our lack of knowledge and the inherent impossibility of governing the conditions of the tests.

Even with the most meticulous care as to technique, the experimenters are unable to prevent variations and mistakes. Blood is so exceedingly sensitive and so instantaneously responsive to the slightest change in environment leading to cooling or to foreign contact, and so subject to constant alteration from the countless complex food-products which are being introduced into it, that no two specimens, even in the same individual, are ever identical.

How then, can we expect any fixed chemical composition in a fluid of this character, and how can there be any finality or exactitude to analytical tests?

As the basis of his enthusiastic acclaim, Professor Hill-Tout uses the 16,000 (not less) tests and tabulated results of Dr. George Nuttall of Cambridge University. He states that these results have been confirmed by other independent workers and are "well-established facts of science." He does not seem to have grasped the extreme delicacy and liability to error in these experiments as Professor Newman has. These tests are now two decades old so they are not in any sense recent as might be inferred. There's a reason for their long neglect and present revival.

Six tables of Nuttall's are given, purporting to prove the conclusive character of this kind of evidence for evolution. Ignoring for the moment, the indisputed fact that these figures are open to grave suspicion because of the utter impossibility of avoiding error, and forgetting that Nuttall was not using "blood," but "serum,"—we still find some curious and striking discrepancies in the figures offered as "evidence" of relationship between man and lower animals.

In Table "A," Anti-human Precipitation Serum is tested against the blood of men, Old World Monkeys, New World Monkeys, Marmosets, and Lemurs. The results indicate that Old World Monkeys, (O. W. M.) are 8 points removed from man, while New World Monkeys, (N. W. M.) are 22 points distant.

But Table B shows O. W. M. 35 points away from Man and Anthropoids, a discrepancy of 27 degrees, between the two tables.

Table C proves O. W. M., Man and Anthropoids to be practically identical.

Table D gives 13 points between O. W. M. and Man, and 27 points between Man and Anthropoids.

Table D, to add to our confusion, suggests that Man is a real Ape, as Friedenthal once claimed. Also, he seems to be a Monkey,—Old World Species. Well may we ask,—"What is man anyhow?"

Table C reveals the fact that O. W. M. and N. W. M. are 42 points separated, but in Table D, an impassable gulf of 64 degrees yawns between.

Table A does not permit Marmoset and O. W. M. to come closer together than 42 points, but Table D, increases the distance to 64.

In Table E, Anti-sheep serum was used on horses and other animals. According to one test, horse and sheep are 84 degrees removed. In this same table, where anti-pig serum was used against horses and sheep, the two latter animals are close brothers, only 3 points apart.

In Table E, also, using the first method, pig and horse seem to be about the same kind of animal,—20 and 16, but in the next method, there looms an unbridgable chasm of 74 points.

In the one, sheep and dog are widely separated by 93 points, while in the other, they are identical with 13 points to their credit.

Table F purports to reveal the genetic relationship of various groups of animals. Here anti-monkey serum was injected into 12 different kinds,—cheiroptera (long-fingered bats), ungulata (hoofed animals, horse, cow, etc.), carnivora (dogs, cats, weasels, etc.). The conclusion we must draw seems to be that only 3 classes of these mammals bear any resemblances to monkeys, these being horse, dog and kangaroo. The last-named is closest, the dog next, and the horse at the furthest extremity in the ratio of 8, 2, 1.

This unquestionably teaches us,—if it teaches anything—that the blood, either of the kangaroo or dog, is safer to man than that of the horse. If the worker experiments with himself according to this principle, it is probable that he would not live long enough to record his experience.

Yet we are informed with the greatest positiveness that the reactions invariably indicate the genetic relationship, and agree absolutely with other methods of comparison.

Nuttall also gives the results of Quantitative Tests (pp. 3, 9, 320 etc.), in which he measured the amount of precipitum as deposit produced by the various blood tested.

There are some results so exceedingly peculiar not to say absurd, that it is difficult to see how any conclusions of value can be drawn.

In the first tests, jackal, otter, ox, sheep, antelope and Tibetan bear, show a definite relationship to man.

In the second and third tests one species of baboon is as closely related to man, and a shore-tailed Old World Monkey (Macacus Rhesus) more closely related, than the ape.

In another test in which the actual proportion of deposit is given very exactly in decimals, ox, sheep and baboon are grouped together with .004; and the whalebone whale, one species of baboon, the tiger, the African Antelope and MAN are the same,—.003. Accordingly, we may make our choice of ancestors between whale, antelope, tiger and baboon!

But we have other possible choices. In the second test, man, the civet cat, and the tenrec, a little mammal of Madagascar, are all on the same level .001. Our forebears are numerous if not noble!

These tests certainly seem to prove rather more than Professor Nuttall bargained for! Even Professor A. B. Scott, friendly as he would like to be to the evidence for evolution has to admit: "It could hardly be maintained that an ostrich and a parrot are more nearly allied than a wolf and a hyena, and yet that would be the inference from the blood tests."

What kind of intellectual equipment and discrimination must we have in order to draw such inferences from the jumbled mass of contradictions and inconsistences provided by these absurd "tests?"

In his "Berlin Discussion of Evolution," Eric Wasmann most emphatically refutes a number of these confident claims for blood. He writes in regard to the alleged proofs from these same 16,000 experiments of Nuttall:

> "Investigations into the reaction of the blood, have been made by Friedenthal, Nuttall, Uhlenhuth, Wasserman, Schutze and others, in some cases with

the express intention of tracing the relation between man and the higher apes, in others for various purposes. Some years ago, Dr. Friedenthal published a work in which he declared, as the result of his researches into the action of the blood, that man was not only descended from the apes, but was a genuine ape himself. This conclusion is deducted from the following facts. It is ascertained that if the blood from one class of vertebrates, especially of mammals, be injected into the veins of another animal, symptoms of disease appear, in consequence of the decomposition of the red corpuscles of one kind of blood by the serum of the other. There is, however, no such result when the two kinds of animals are closely related. Careful experiments have proved that there is a very feeble reaction between human blood and that of apes, and this has led to the inference that man and the apes must be closely connected. Conversely, in the reaction of the antiserum, the morbid effects is most marked in the case of animals most closely related.

"But we are not justified in regarding a chemical and physiological resemblance as constituting a blood relationship in the sense of having a common origin. Let us assume that there is a blood resemblance between the blood of apes and that of man. This would prove that the same kind of likeness exists in the blood of men and apes, as in their skeletons and other organs, but similarity does not imply blood-relationship, such as exists between cousins and kinsfolk. Rossle has recently brought out an interesting work on this subject (in the Biologisches Zentralblatt for 1905, Nos. 11 and 12). He is of opinion that the blood reaction only enables us to say that one animal is more closely related to another than to a third, but it does not show how closely related, still less that man ought to be classed with the higher apes. He (Rossle) also insists upon the fact that the chemical composition of the fluids of the body, such as the blood, is no more constant, for instance, than the formation of the skeleton, therefore, evidence based on resemblance of the blood is no more trustworthy, in support of a common descent, than that based on similarities of the skeleton and other morphological resemblances.

"And the blood reaction points to a close relation between creatures that are morphologically far apart. It would seem that we cannot make much of evidence derived from similarity of blood if comparative morphology arrives at different results.

"More recent investigations by Uhlenhuth and Friedenthal tend to throw doubt upon the alleged actual existence of similarity between human blood and that of higher apes, and this circumstance renders untenable all the conclusions based on the similarity, viz., that

> man is closely related to the higher apes or is even an ape himself.
>
> "I would like to refer to some recent microscopical investigations made by Raehlmann into the red corpuscles. Those occurring in human blood present certain peculiarities that are not found in the blood of other vertebrates."
>
> On page 299 of the same book, Wasmann writes: "I was very glad to hear Dr. Friedenthal state definitely that his chief aim was simply to demonstrate the chemical and physiological resemblances existing between different kinds of blood. We are therefore of one mind, and the popular idea that he interpreted kinship of blood to imply a common origin or descent was based upon a mis-conception."

All the facts enumerated should now enable us to get at the meat in the cocoanut. What value if any, have these 16,000 tests of Nutall? Do they prove anything more than a chemical resemblance between the different kinds of blood?

A general survey of this work reveals grave and obvious fallacies which render conclusions absolutely valueless, and show that there are very slight grounds indeed for the confident expressions of the animal-ancestry advocates.

Professor Nuttall seems to realize the difficulties inherent in the experiments, when he writes:

> "In view of the crudity of our methods, it is not surprising if certain discrepancies may be encountered in the

> course of investigations conducted by biological methods. The object of my investigation has been to determine certain broad facts with regard to blood affinities, consequently my studies must be regarded in the light of a preliminary investigation which will have to be continued along special lines by many workers in the future."

In his book, he devotes 15 pages to "sources of Error," showing how great is the risk of mistakes which invalidate every conclusion.

We must remember that neither Professor Nuttall nor any of the workers used "blood" in their tests. It was simply the chemically changed liquid residue left after the process of clotting had been completed.

Not even where they were working with normal blood plasma since from this, many valuable constituents had been extracted and another new substance added in the process of formation of "platelets." And of course, all the blood cells with their amazingly complex proto plasm and the mysterious and unknown life-principle had been completely eliminated.

Under such conditions as these, it would seem to require only a very ordinary degree of intelligence to reject any conclusions whatever as to blood kinship, derived from these operations.

Think of the question in this way. These blood cells are living individuals, breathing, feeding, excreting and moving, almost the same as any other living organisms. They live and reproduce in a liquid environment which surrounds them and supplies them with the necessities of life, air, water and food. Humans do the same, except that our environment is not fluid and we adopt different means of securing these three essentials to life.

What has the experimentor done? He kills these little cellular individuals, and then proceeds to examine their environment, the watery liquid with its complex quota of chemical substances upon which the minute creatures depend for their existence.

From investigations which are very difficult, uncertain and tricky, he proposes to decide the relationship between the many dead owners of the blood, which in life, contained the same basic elements in varied combinations.

Could we not, just as logically, apply the same principle in a slightly modified form? With equal promise of accurate results we might exterminate a collection of representatives of Genus Homo, preferably perhaps, Fundamentalists from benighted Tennessee! Also, some salt water fish, a number of fresh water fish, kangaroos from Australia, and Hippopotami from Africa, Rhinoceroses from India, Camels from Central Asia, and Llamas from South America? Having extinguished the life of these animals, we proceed to investigate their environment, the atmosphere they have breathed, the liquids they have absorbed and the essential foods they have consumed.

After very careful analysis, we prepare a number of tables supposed to give the exact genetic relationship between the dead animals and man, the latter represented by the unfortunate citizens of the Southern State, once dwellers in that region of medieval darkness. Who can deny that our tabulated results would have as much claim to accuracy and dependability as those of Nuttall, "et al?"

What then, is the explanation of blood resemblances and differences? The blood-serum is nothing more than a phase of the morphological argument, which compares the structure of various animals, and from the assembled similarities and dissimilarities, affects to prove a common origin or a different origin.

There is one good and sufficient answer to all such alleged "proof," and it is, that similarity in bodily structure and formation is absolutely no evidence of a genetic blood relationship.

If there is anything in the statement that blood-reaction reveals the measure of kinship, why should one human being thrive on blood, which, if injected into another human being, would result in death to the second?

Again, why should the blood of a horse introduced into a man's veins, be less harmful than the blood of another human being injected into the same man? Is one of these men, on account of this pecularity, to be excluded from membership in the human race, while the horse is granted honorable admission?

God created different kinds of mammals. For their preservation and existence, He gave them blood. It varies somewhat in different types, the variation depending on conditions of which we are in almost complete ignorance. But why should this give us the right to assume a "common ancestor," for all?

It would seem to be the most sensible and natural thing in the world for an Omniscient and Omnipotent Creator and Designer to provide a similar circulating, nourishing, fluid medium to flow through the vessels of all animal bodies. While the constituents of this medium are the same in their simplest form, their combinations are subject to innumerable changes, incidental and inevitable because of the great variety of foods constantly thrown into the blood stream.

Each animal, no matter how widely separated genetically, has to perform the same functions of respiration, digestion, excretion, movement, all of these accompanying and necessary to life. The same or similar organs and tissues are the logical outcome of perfection in the general basic plan.

The Creator's plan for this intricate and involved life system, as we see it in the whole animal kingdom around us, the members interwoven and interdependent, related and unrelated, demands many complicated similarities and dissimilarities. Such a vast number of indivdual types makes it manifestly impossible that there should **not** be many instances of similar or even identical structure in forms widely separated from each other,—considered on any rational basis of classification.

The blood is only one of many tissues like bones, muscles and organs, and a similarity in blood composition between man and lower animals, even if much more marked than it actually is, would have little or no bearing as evidence of community of origin, or of an evolutionary process connecting man with inferior life-forms.

Were it possible, by careful juggling of the peculiar necessary conditions, to establish **close** resemblance between the blood of the higher ape and man, the problem would still be the same.

As frequently happens, there is confusion of thought regarding two ideas, namely, resemblances in the chemical properties of two kinds of blood, and identity of genetic relationship.

Unless and until we are absolutely **certain** that blood from two animals cannot be chemically similar without having a common ancestry we have no right to draw the latter inference. Without doubt, no such **certainty** has been proved to exist.

The propounders of this blood argument have extracted from the facts, not the evidence which the facts proclaim, but the interpretation of their own highly cultured imagination, dominated by a materialistic and evolutionary bias.

Parallelism in organisms having separate ancestors, arises, not from heredity, but from the uniform action of universal morphogenetic forces. Organisms have much in common that transcends any possible scheme of evolution, much that cannot be brought into alignment with the position arbitrarily assigned them in the evolutionary family tree.

Living matter has certain universal properties, progoverned by distinct laws of organization quite adequate to account for all observed homologies and analogies.

Exposed to similar environmental conditions, organisms have the power of solving their individual life-problems in parallel fashion, irrespective of any near or remote relationship.

To suppose that inheritance alone can account for structural resemblances, is an unwarranted assumption. A logical, intensive and critical examination of all the evidence, affords no justification for interpreting the resemblance of homology—of which this blood similarity is one—as surviving vestiges of an ancient hypothetical "common-ancestral" type.

Margaret E. Paul.